

Krackow Suture Technique Effect on Patella Tendon Vascularity: Quantitative MRI Analysis

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Purpose: We sought to assess the effects of Krackow suture technique on the vascularity of the patellar tendon.

Methods: Six fresh-frozen matched pair cadaveric knee specimens were utilized. The superficial femoral arteries were cannulated in all knees. The experimental knee underwent an anterior approach, patellar tendon transection from the inferior pole of the patella, 4-strand Krackow stitch placement, patellar tendon repair via 3-bone tunnels, and standard skin closure. The control knee underwent the identical procedure without Krackow stitching. All specimens then underwent pre- and post-contrast enhanced quantitative MRI (qMRI) assessment (with gadolinium-based contrast agent). Region of interest (ROI) analysis was performed to assess for variation in signal enhancement between the experimental and control limbs in various patellar tendon regions and subregions. Latex infusion and anatomical dissection were performed to further evaluate vessel integrity and assess extrinsic vascularity.

Results: qMRI analysis demonstrated no statistically significant difference in overall arterial contributions. A small but nonsignificant decrease of 7.5% (standard deviation \pm 7.1%) in arterial contributions to the entire tendon was observed. Small non-statistically significant regional decreases throughout the tendon were also detected. In the regional analysis, the largest to smallest decreases in arterial contributions following suture placement were found in the inferomedial, superolateral, lateral, and inferior tendon subregions. In the anatomical dissection, nutrient branches were seen dorsally and posteroinferiorly.

Conclusion: The vascularity of the patellar tendon was not significantly affected by Krackow suture placement. Analysis demonstrated small and not statistically significant decreases in arterial contributions suggesting this technique does not significantly compromise arterial perfusion.

Table 1: Quantitative-MRI results. Comparison of control to experimental groups.

Patellar Tendon Region	Reduction in arterial contributions in experimental versus control limb*				
	Mean ^a	SD ^b	Median	Range ^c	P Value ^d
Full patellar tendon	7.5%	7.1%	1.1%	0.2-5.7%	0.699
Inferior	8.1%	5.2%	2.0%	0.0-4.7%	0.818
Superior	6.8%	5.3%	0.5%	0.0-3.0%	0.699
Medial	6.9%	10.6%	6.3%	1.1-14.5%	0.699
Lateral	8.1%	8.5%	4.9%	0.0-14.6%	0.818
Inferomedial	9.3%	21.7%	0.0%	0.0-1.8%	0.818
Inferolateral	6.9%	6.7%	5.9%	1.2-12.2%	0.589
Superomedial	4.5%	7.0%	0.0%	0.0-8.8%	0.818
Superolateral	9.2%	10.5%	6.4%	1.2-13.5%	0.818

^a Mean decrease in regional quantitative-MRI signal enhancement in Krackow-suture specimen compared to contralateral controls.

^b SD=standard deviation.

^c Ranges are reported as interquartile ranges (25-75th percentile).

^d Mann-Whitney U test (significance set at $p < 0.05$).

The FDA has stated that it is the responsibility of the physician to determine the FDA clearance status of each drug or medical device they wish to use in clinical practice.